CONCEPTUAL DATA MODEL DOCUMENT
April 30, 2004
Updated 5/26/04, 8/11/04

Purpose
The purpose of this model is to have a complete and concise picture of **all** of the BLM's spatial data. It is not a database model, but rather an organizational model which provides a logical structure for existing data and, just as important, for new data being created every day. Using the model will allow the spatial database to grow in an organized fashion and control complexity and duplication. The goal is to migrate toward simpler data organization which is easier to understand, use and maintain.

Intended Audience
This document is intended to give managers and data stewards information about the OR/WA Data Design project, in particular the progress and status of the work on the conceptual data model. It is also intended to provide a basic documentation of the work that has been accomplished. It is envisioned that this document will be updated as additional steps are taken. It will become a final document once work on the conceptual model is completed and the effort moves on to development of the logical data model.

Methodology
Data Design Team – As part of the ArcGIS Transition Plan there was a sub-task identified for "Data Standards, Geodatabase Design, Metadata". The goals for this team are to: 1) migrate data from the existing ArcInfo Workstation library structure into the ArcGIS geodatabase structure and 2) redesign our data to take advantage of the relational database nature of the geodatabase. In November 2001 a team was established to address this task. Since that time there have been additions to the original team as the activities moved from the initial inventory stage, to rehosting of data in SDE, and finally to initial conceptual data model. Current team members are: Stan Frazier, Dan Wickwire, Georgia Bosse, Arthur Miller (all from OR-955), Pam Keller (Burns District), Debbie Smith, Barbara Welsh, and Steve Salas (Titan Contractors), Alan Rhodes and Mark Koski (Salem District), Duane Dippon, Janis VanWyhe, Jim Alegria, and Chris Cadwell (Division of Renewable Resources, Marc Thomas (Division of Management Services), and Kate Taylor (ESRI).

Initial Data Groups/Categories – The first design task that the team addressed was to identify data subject areas (high level groupings of data). An early decision point was whether to categorize data based on the use of the data or on the intrinsic qualities of the data. The initial set of data subject areas (October 2002) included 16 groups (e.g. archaeology, climate, fire, lands, etc) which are more a reflection of data use than intrinsic qualities. After giving this more thought it was decided that the highest level of data subject areas should be based on intrinsic qualities (does it occur naturally, is it a physical thing but built by humans, is it a human concept that may not have any physical appearance). The top level of the data subject areas were changed to just four data types:

a. **Resources** - Natural. Exist physically. Attributes include factual data;
b. **Facilities** - Human structures. Exist physically. Built on top of resources;

c. **Boundaries** - Human constructs. Often no physical existence;
d. **Activities** - Human. Attributes include target, benefit, costs.

Data groupings in the lower (2nd, 3rd, etc) levels are based on use similar to the initial data subject areas. This formed the basis for the first conceptual data model.

Conceptual Model Concepts – A team meeting was held August 27-28, 2003 where we discussed the data design project, what had already been done, developed a project plan, and discussed the next step to take. The development of an initial conceptual data model was that next step. Pam Keller was tasked to create this 1st cut at a conceptual model. In our team meeting the ESRI contractor stated that this model should go to the "entity" level and when asked what she meant by entity, she said "feature class" which is a collection of related spatial things (features) with the same geometry (a group of related point features or a group of related line features).

One of the main purposes of a conceptual model is entity definition.

Entities in a GIS data model are spatial and their definitions are dependent on their spatial characteristics.

The model attempted to capture **all** the **unique** spatial entities and in addition the model shows each unique spatial entity only **once**. Three examples:

a. Fish species could be listed under RESOURCES-SPECIES OCCURRENCES but fish are spatially "attached" to streams which are already listed under RESOURCES-WATER
b. Recreation use data could be associated with any number of boundaries (campgrounds, wilderness areas, resource areas, etc.), all of which are already accounted for in the model so recreation use data does not create a new entity.
c. Weed infestations are spatially defined differently from areas surveyed for weeds and there must be two distinct spatial entities even though there will be many duplicate areas between the two entities.

Attributes associated with spatial entities are stored in subject oriented tables (e.g. recreation information, fish species information, etc.) and linked to the spatial entities. There will be tables containing very different subject matter but linked to the same spatial entity. The model does **not** attempt to show these tables, only the spatial entities. The model does attempt to show **core** attributes that are directly attached to the spatial entity table. Core attributes include: linking fields, attributes commonly used by many user groups and attributes which lead to new features (lead to line splits or new polygons).

Geometry is one of the primary characteristics of spatial entities. In addition to the fundamental geometry of point, line, polygon or raster there is a 2nd level geometry that must be described. It defines whether the features are distinct and isolated or form a continuous, connected layer on the landscape and whether it is

necessary to have overlapping features. Overlapping lines or polygons are complex geometry and are only used when the spatial definition of the data involves non-finite overlap (as with tracking continuous change over time).

With all of the above as background, model groups were based on a number of considerations including:

Core attribute commonality
Geometry
Subject matter
Update characteristics
Query and analysis

There have been three iterations of the conceptual model so far. Additional iterations will occur as future reviews are completed.

Accessory Model - This model steps back from the more detailed conceptual model and depicts the data with a different view. The overall goal is the same: to have a complete and concise picture of **all** of the BLM's GIS data, but the organization is not based on any physical implementation. The conceptual model groups data entities according to commonalities of definition, spatial characteristics, core attribute and query requirements and data maintenance considerations. This accessory model groups data entities by subject matter commonality. It is therefore closely tied to BLM program areas such as Fire, Wildlife, Minerals. Each of the program areas will be found in all four of the top level categories (Resources, Facilities, Boundaries and Activities). This model was developed to aid in communications with data stewards and program managers. The four diagrams that make up the Accessory Model can be found in Appendix 2.

Presentations – Two presentations have been made to begin the dialogue with data stewards and GIS specialists. The first was a presentation at the Data Stewardship Workshop (Oct 1-2, 2003). This was a short presentation for about 20 data stewards to describe the intent of this work and to show some examples of the models. The 2nd draft model was presented at this workshop. The second presentation was at the OR/WA Field User Group meeting (Oct 14-16). This presentation was very similar to the one done for data stewards. The 3rd draft model was presented at this meeting. One of the major outcomes of this presentation was the need to develop the Accessory Model (described above).

Current Conceptual Data Model-Summary of Changes

The current conceptual model is revision 3 for all groups except cadastral boundaries where the current version is revision 3a (this was a minor adjustment to version 3 to add "special management areas-critical habitat" to the model). Major changes that have occurred between development of the initial conceptual model and the current model are:

- Established primary model concepts.
- Defined the meaning of entity. Model to capture all unique spatial entities, show each unique entity only once.

- Show only necessary core attributes for each entity, not the full scope of information that might be used in relation to the entities.

- Recognize the nature of entity geometry. Is entity inherently continuous or consisting of isolated occurrences over areas of interest? Does entity overlap similar entities, etc.

- With this information explored, the base model groups were formed taking into account core attribute commonality, geometry, subject matter, update characteristics, query and overlay users.

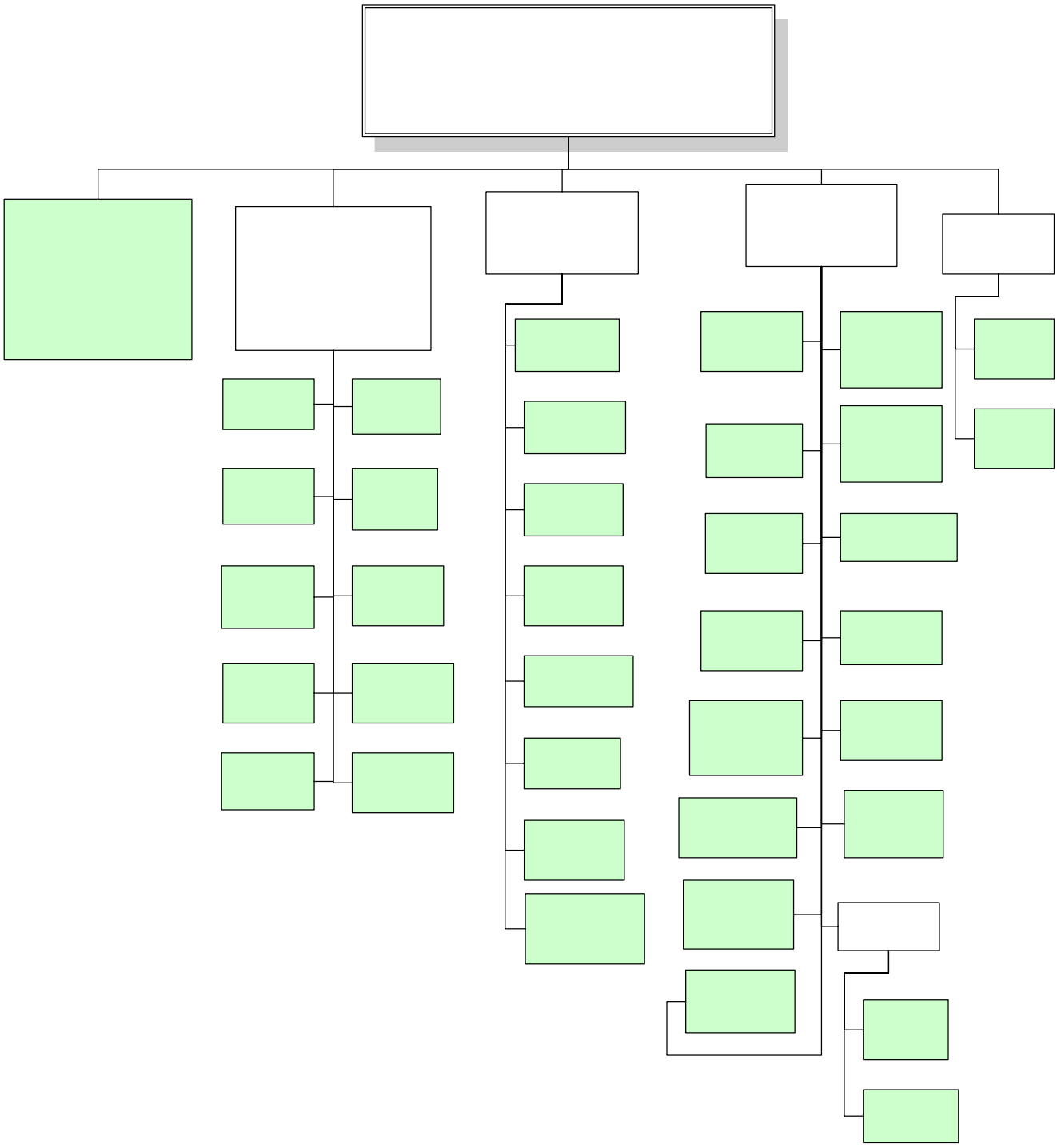
- Clarification of terminology. Many minor changes, most toward more precise terminology (ie. Boundaries changed to Cadastral Boundaries).

- Clarification of the spatial concept behind Activities entities. These entities represent location and area of where activities occur rather than data resulting from of activities.

The detailed information on changes by model version can be found in Appendix 3.

What follows are the current models for each Data Subject Area followed by definitions for each major entity in that model.

Figure 1 - Boundaries



PLAN AREAS
1. link to activities and/or facilities through **project name**
2. often associated with a single

Figure 2 - Resources

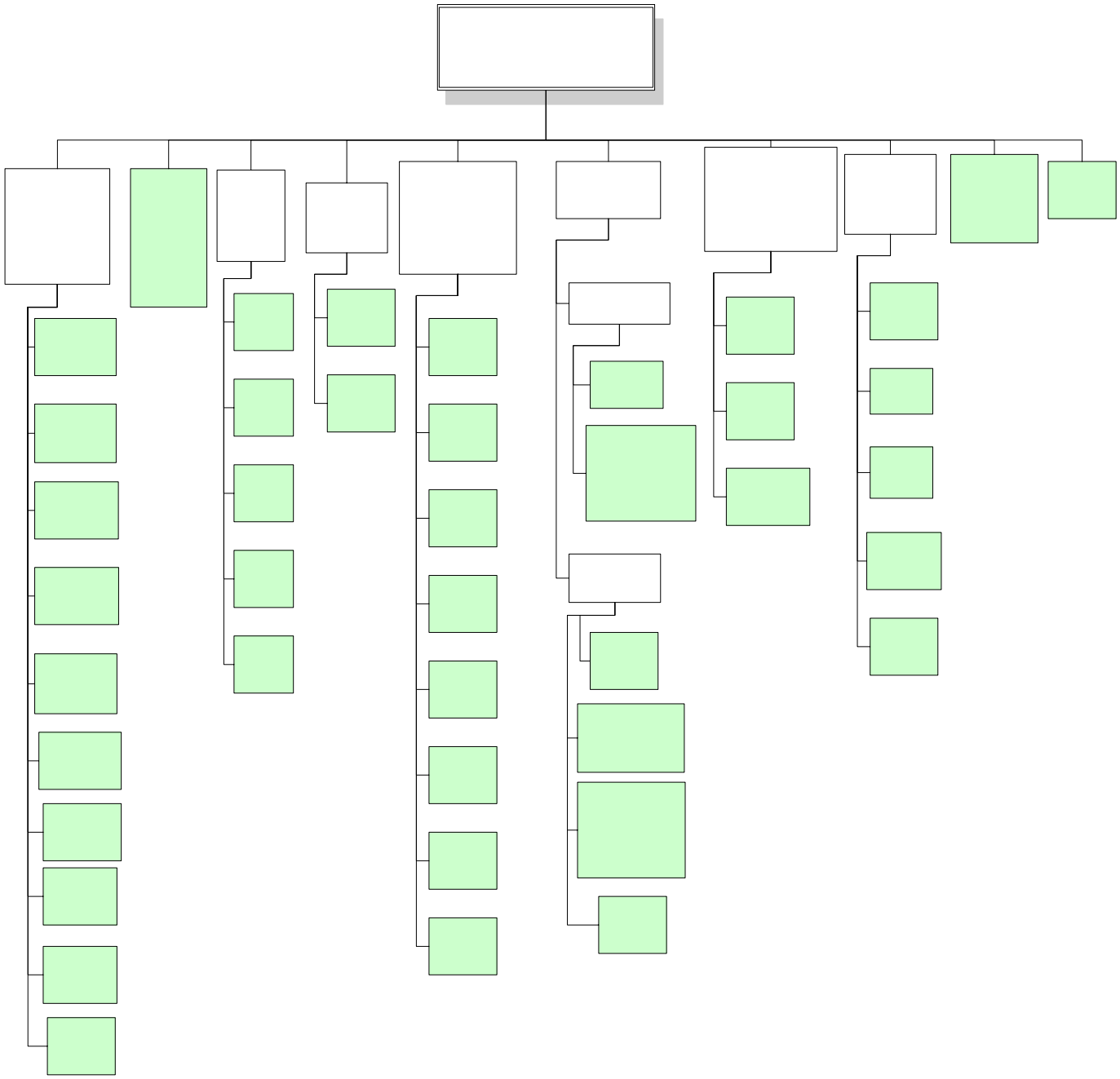


Figure 3 - Facilities

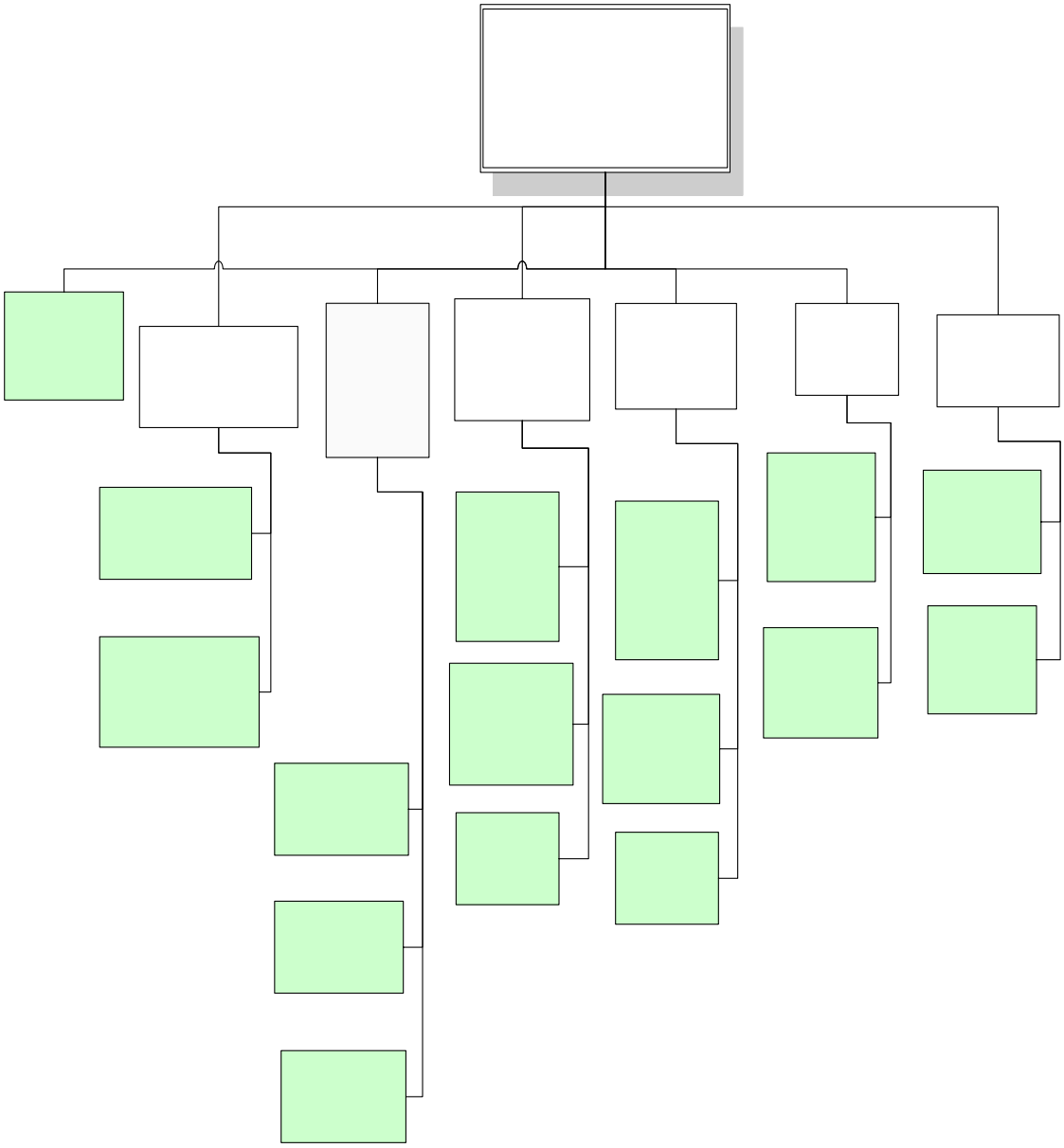
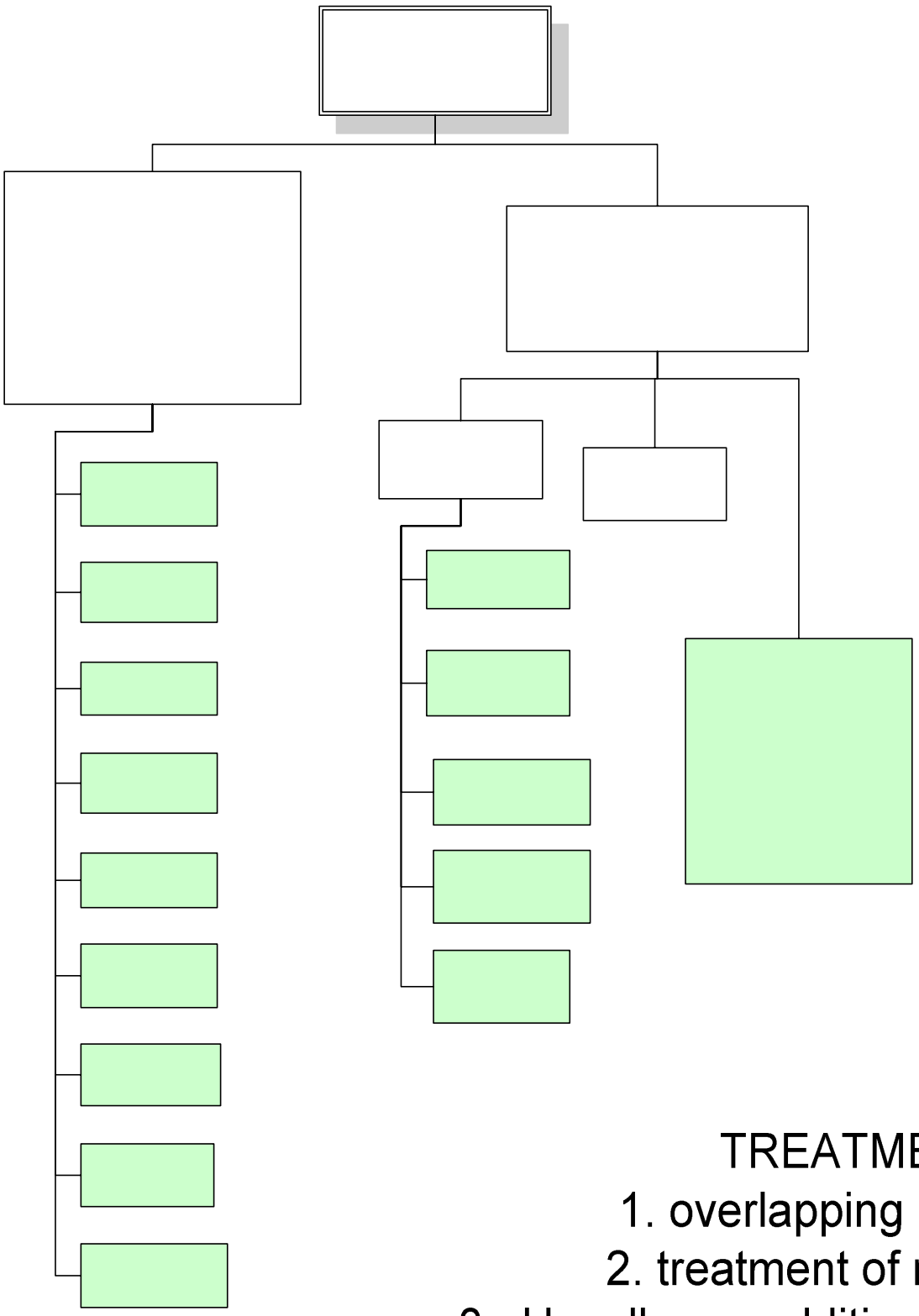


Figure 4 - Activities



TREATMENT
1. overlapping polygons
2. treatment of resources
3. Usually are additional themes ar
attributes for status phases “PLANN
“ACTIVE” and “COMPLETED”

Next Phases

1. Data Steward Review – The next step in development of the conceptual data model is to get in-depth review by the data stewards. This is needed to make sure that the data needed by data stewards in their day-to-day work is accounted for as well as making sure definitions and relationships are correct.
2. Logical Data Model – Once the conceptual model is completed the next phase is development of the logical data model. This model contains a greater level of detail, especially with regards to relationships between entities and attributes of each entity. At this stage geometry types are defined, attributes, subtypes, spatial integrity rules, domains, cartographic reference rules, etc are defined.
3. Project Plan – The project plan is fluid and changes quite often (especially in the area of due dates). The current plan (at a fairly high level) is shown below.

	Task Name	Duration	Start	Finish
1	**Conceptual Design**	**140.5 days**	**Mon 9/1/03**	**Mon 3/15/04**
2	Initial Cut at Conceptual Model	5 days	Mon 9/1/03	Fri 9/5/03
3	Review by Data Team	5 days	Mon 9/8/03	Fri 9/12/03
4	ID Data Team	5 days	Tue 9/2/03	Mon 9/8/03
5	**Kick Off Meeting**	**3 days**	**Mon 9/15/03**	**Wed 9/17/03**
9	Create Conceptual Model Document	16 days	Fri 10/31/03	Fri 11/21/03
10	Review by Data Team	4 days	Mon 11/24/03	Thu 11/27/03
11	Present to Data Stewards	2 days	Fri 11/28/03	Mon 12/1/03
12	**Develop Conceptual Model**	**44 days**	**Tue 12/2/03**	**Fri 1/30/04**
23	Data Steward Introductory Meeting	0.5 days	Mon 2/2/04	Mon 2/2/04
24	Data Steward Interviews	30 days	Mon 2/2/04	Mon 3/15/04
25	Data Team Review Meeting	1 day	Tue 1/13/04	Tue 1/13/04
26	Update Model based on Comments	10 days	Wed 1/14/04	Tue 1/27/04
27	Presentation at Winter FUG Meeting	3 days	Tue 2/17/04	Thu 2/19/04
28	Presentation to Management	0.5 days	Tue 3/2/04	Tue 3/2/04
29	Notice to Proceed	0 days	Tue 3/2/04	Tue 3/2/04
30	**Logical Design**	**84 days?**	**Fri 2/20/04**	**Wed 6/16/04**
31	**Develop Logical Model - for each entity:**	**84 days?**	**Fri 2/20/04**	**Wed 6/16/04**
32	**Logical Design Methodology Workshop**	**1 day?**	**Fri 2/20/04**	**Fri 2/20/04**
38	**Develop Logical Models for Priority Layers**	**40 days**	**Mon 2/23/04**	**Fri 4/16/04**
49	Develop UML Model	40 days	Mon 3/22/04	Fri 5/14/04
50	Generate Schema	1 day	Mon 5/17/04	Mon 5/17/04
51	Define Metadata	5 days	Tue 5/18/04	Mon 5/24/04
52	Load Sample Data	5 days	Tue 5/25/04	Mon 5/31/04
53	**Schema Presentation Workshop**	**1 day**	**Tue 6/1/04**	**Tue 6/1/04**
57	Review & Comment Submission by Data Team	5 days	Wed 6/2/04	Tue 6/8/04
58	Update Model based on Review	5 days	Wed 6/9/04	Tue 6/15/04
59	Review by Stakeholders at June FUG	1 day?	Wed 6/16/04	Wed 6/16/04

APPENDIX 1 - DEFINITIONS

General GIS and Modeling Definitions

ArcGIS – An integrated scalable family of GIS software products from ESRI for data creation, management, integration, and analysis. Consists of (ArcCatalog, ArcMap, ArcToolbox, and more).

ArcInfo Workstation- Classic command line interface GIS from ESRI consisting of (ARC, ARCEDIT, ARCPLOT, ARC Macro Language [AML], and more).

SDE- Spatial Database Engine, software from ESRI that facilitates management of spatial data in a relational database management system.

Conceptual Data Model – Organizing principles that translate into functional descriptions of how phenomena are represented and related to one another.

Entity – A person, place, thing, or concept that we want to keep information about.

ESRI – Environmental Systems Research Incorporated is the company that makes the GIS software that the Bureau uses.

Feature – A specific instance (point, line, polygon) of an entity. A representation of a real world object.

Feature Class – A collection of features with the same type of geometry and the same type of attributes. When referring to geographic features, feature classes include point, line, area, and annotation.

Feature Dataset – A collection of feature classes that share the same spatial reference.

Geodatabase – (short for geographic database) is a physical store of geographic information inside a database management system (DBMS).

GIS –An information system that is designed to work with data referenced by spatial or geographic coordinates. ... both a database system with specific capabilities for spatially-reference data, as well [as] a set of operations for working with data. *From Jeffrey Star and John Estes, in Geographic Information Systems: An Introduction (Englewood Cliffs, NJ: Prentice-Hall, 1990), page 2-3:*

Logical Data Model – describes the data requirements to support a functional activity. An abstract representation of the structural data requirements of part or all of the operations of an organization.

Physical Data Model – describes an automated solution based on the physical environment and performance concerns. A framework for a physical database which may include: referential integrity, indexes ,views , alternate keys and other constraints, tablespaces and physical storage objects.

Relationship – An association or link between two objects in a database. Relationships can exist between spatial objects (features in feature classes), non-spatial objects (rows in a table), or between spatial and non-spatial objects.

Spatial – Data having an attribute of location in a definable coordinate system.

General Terms/Abbreviations used in all the model charts:

Core atts The most important attributes of an entity including those attributes used commonly by many user groups or attributes used for linking to other tables or attributes which lead to new features (line splits or new polys).

Derived Data is created from already existing entities through selection, clipping, intersection, etc.

Entity Group of objects with similar spatial characteristics and attributes. Generally equivalent to an ArcGIS feature class. Indicated in the model by green shaded boxes.

External source The source of the data is non-BLM.

Feature An instance of an entity, for example a single stream segment in the streams entity.

Generated Data is created from already existing entities purely through calculation for example slope and aspect from DEM.

Linking fields Attributes whose values are identical in more than one database and used to link the databases. Indicated in the model by bold type.

Line A connected series of x,y coordinates representing a geographic feature best interpreted as a line. Has length, but not area.

Point A single x,y coordinate representing a geographic feature best interpreted as a single point on the earth. Has no area or length.

Polygon (poly) A two dimensional shape representing a geographic feature best interpreted as an area. It's perimeter is a line which closes on itself.

Overlapping polys Overlapping polys are two polys occupy all or part of the same geographic space. In the context of this model, overlapping polys refers to those where, in the area of overlap, the two polys have different values for an attribute **and** those values are recorded only for their respective poly rather than both values on both polys.

Raster Represents an area using rectangular cells.

RESOURCES:

AirQ Air Quality zones in the sense of degree of pollution in a particular air space.

Aspect Facing a particular compass direction in degrees or cardinal point.

Bighorn Sheep Potential habitat for this animal.

Bugs Areas of occurrence of insect or disease infestion.

Climate Group of entities which describe weather conditions.

Cultural Sites Location of archaeological finds.

Cultural Site Prediction Process of using current and historic landscape characteristics to predict location of previously unknown cultural sites.

Current Cover Group of entities describing the current vegetative covering (or lack thereof) over the entire landscape.

Ecological Potential Group of entities describing the potential vegetative covering over the landscape in terms of site characteristics such as soil. What the landscape would look like if there were no disturbances.

Elevation Height above sea level as contours and zones.

ESI Veg Current vegetation communities mapped across the landscape using Ecological Site Inventory methodology.

Faults Linear fracture and displacement in the earth's crust.

Fire see WILDFIRE

Fire Behavior Analysis and prediction of spread and severity of a wildfire

FOI Forest Operations Inventory. Current vegetation communities mapped across the landscape with an emphasis on commercial tree species data.

Formations A geologic unit, recognizable bed of rocks or series of beds.

Fuels Mapped vegetative cover that is considered fire fuel.

Geology Group of entities describing the rocks and minerals of the earth's crust.

Habitat Potential Group of entities which derive areas of potential habitat for plants and animals using current and historic landscape data and known occurrences.

Hydrologic Units Hydrologic Unit Classification. Watershed delineations at any level (basin/subbasin/watershed/subwatershed) generated from elevation data.

Imagery Veg Current vegetative communities across the landscape derived from satellite imagery classification.

Lakes Inland bodies of water on the surface of the earth, including reservoirs.

Landform A natural feature of the land surface such as hills and valleys.

Landscape Group of entities describing features that can be thought of as covering the surface of the earth from "wall-to-wall" such as soil and plant communities.

Leasable Minerals Minerals that are leasable by the BLM including energy minerals such as oil, gas and geothermal plus sodium, diatomite and others.

Locatable Minerals Minerals that are generally thought to be "mined" such as hard rock (gold, silver, copper) and uranium.

Model Group of entities for predicting the natural world when direct measurement is not possible. These are future or past oriented: what we think the physical resource looked like in the past or will look like in the future. This term does **not** refer to a *representative* model (a model of

the currently existing resource). These are new entities created from two or more other entities.

Physiographic Provinces Ecological zones generally defined by physical landscape characteristics.

PPT Precipitation (rain,snow) isolines and zones.

Rare Plants Potential habitat for rare, endangered, sensitive or threatened plant species.

Resources Group of entities which are natural and exist physically.

Sagegrouse Potential habitat for this animal.

Saleable Minerals Minerals that are classified as saleable by the BLM includes sand, gravel and decorative stone.

Seed Zones Areas for seed collection.

Sensitive Animals Existing occurrences of rare, endangered, sensitive or threatened animal species.

Sensitive Plants Existing occurrences of rare, endangered, sensitive or threatened plant species.

Slope Degree of inclination of the surface of the earth represented as zones.

Soil The loose surface material of the earth in which plants grow and which determines the potential plant community.

Solar Areas of different amounts of radiation from the sun.

Species Occurrences Group of entities which identify specific occurrences of plant and animal species and track their extents over time.

Springs A point source of water issuing from the ground.

Streams A body of running water flowing on the surface of the earth. Usually represented as a line, but includes polygons.

Temp Air temperature isolines and zones.

Terrain Group of entities describing the shape of the earth's surface.

TPCC Timber Production Capability Classification ???? A classification of the potential forest community and productivity.

Viewshed The area "visible" from a particular point, line or area. The notion of visible may include other criteria besides visible by the eye.

Water Group of entities describing inland water on the surface of the earth.

Weeds Undesirable plant species.

Wildfire Wildland fire started through natural, accidental or malicious causes.

Wildlife Existing occurrence of wildlife species.

Wind Movement of the air. Zones with ranges of typical wind velocity at certain time of year.

FACILITIES:

Airstrips Active landing areas for aircraft.

Facilities Group of entities for currently existing human built physical structures.

Minerals Facilities Group of entities for facilities related to mining activities.

MIN_FAC_POLY Mining facilities best represented as area features.

MIN_FAC_POINT Mining facilities best represented as point features.

Place Point locations representing towns, buildings, and landmarks.

Range Facilities Facilities constructed for livestock management that are not water related such as fences, gates and corrals.

Recreation Facilities Group of entities for facilities related to recreation.

RECAREA Recreation facilities best represented as area features such as campgrounds, parks and watchable wildlife areas.

RECPOINT Recreation facilities best represented as point features such as interpretive signs, trailheads and campsites.

Railroads Linear routes constructed for the purpose of train travel.

Roads Linear routes constructed for the purpose of car and truck travel including jeep trails.

Trails Linear routes constructed for the purpose of hiking for recreation.

Transportation Group of entities for facilities constructed for vehicular transport.

TRNPOINT Point features associated with transportation entities such as bridges and cattle guards.

Utilities & Communication Group of entities for facilities related to utilities and communication.

UTIL_FAC_LINE Utilities facilities best represented as line features such as power, phone and gas lines.

UTIL_FAC_POINT Utilities facilities best represented as point features such as power poles, radio towers and fire lookouts.

Water Facilities Group of entities for facilities related to water management.

WAT_FAC_LINE Water facilities best represented as line features such as pipelines.

WAT_FAC_POINT Water facilities best represented as point features such as wells, guzzlers, dams and culverts.

BOUNDARIES:

ACEC Areas of Critical Environmental Concern. Areas designated for special management as part of a land management plan.

Air Traffic Zones Administration of air space including military training routes and operational areas and traffic control zones.

BLM Resource Areas Basic administrative areas for the BLM. One or more Resource Areas comprise a BLM District.

Boundaries A human construct, often with no physical existence, that defines lines separating areas with differing management, rights or restrictions.

Cadastral Having to do with the the official survey (linear measure) of the land.

Census Blocks Divisions made within the country for the purpose of recording demographic data. One or more census blocks comprise a Congressional District.

County/State Land Use Zones Planning zones designated by the County or State.

Claims/Leases Mineral rights to the land granted by BLM to private parties.

County Governmental divisions made within each State.

ESA Critical Habitat Areas identified as critical habitat for endangered species in accordance with the Endangered Species Act.

Exchange An exchange of land between government agencies or between a government agency and a private party. May include both surface and subsurface rights.

Fire Mgt Zones Areas with differing fire management designated through a land management plan

Forest Reserve Forested area set aside for special management.

GCD Geographic Coordinate Database. Points generated from cadastral survey or using an algorithm where survey information is not available.

Grazing Allotment An area of land where one or more livestock operators graze their livestock.

Historic Refers to the period of time after Euro-American settlement until 50 years ago.

HIST-LINE Historic features on the land that are best represented as lines.

HIST-POLY Historic districts and other areas.

Land Tenure Zones Areas of BLM administered lands determined suitable for certain distinct types of disposal, exchange or retention.

Land Status Group of entities containing official description of land parcels and the rights and restrictions on land parcels.

Leasing Stips Restrictions on the leasing of BLM administered lands (surface and subsurface) for mineral development.

National Monuments A natural landmark or a structure or site of historic interest set aside by a national government and maintained for public enjoyment or study.

OHV Off Highway Vehicle (motorized vehicle designed for travel over natural terrain). Areas set aside with specific management prescriptions for OHVs.

Political & Administrative Related to public policy and law or to the management of government entity jurisdictions.

Project Areas Any area where a specific action or set of actions will be analyzed and perhaps undertaken by the BLM.

Quads USGS 7.5 minute quadrangles.

Reference Entities used solely for geographic orientation.

Resources at Risk Areas Areas of similar natural and human resource characteristics at risk in the event of wildfire.

ROS Recreational Opportunity Spectrum. Areas of similar recreational opportunities in terms of solitude, motorized vs. non-motorized and other characteristics.

ROW & Easements Rights Of Way are routes and areas where BLM has granted access for specified purposes and Easements are routes and areas where BLM has been granted access.

ROW Avoid Areas Areas with sensitive resource values where rights-of-way authorizations will be discouraged or excluded.

Special Mgt Areas Group of entities containing boundaries for special areas created through planning efforts.

Subsurface Own Jurisdiction (ownership rights and restrictions) of the subsurface (minerals).

Surface Own Jurisdiction (who has the right to determine management) of the surface of the land.

TRS Township, Range and Section from the Public Land Survey System.

TRS_Carto Fictitious Township/Range lines for internal display purposes only.

VRM Visual Resource Management. The inventory and management of visual resources in terms of the degree of alteration that is acceptable within each zone of common visual resource characteristics. Visual resources are the natural features visible on BLM lands.

WHB Herd Areas Wild Horse and Burro Herd Areas were set aside by Congress in the 1970's with relatively vague boundaries. BLM manages horses and burros on BLM lands within Herd Management Areas which are well-defined areas within (or in some cases adjacent to) the original Herd Areas.

Wilderness A large, unsettled, uncultivated and unroaded area set aside by Congress to be left in its natural state.

Withdrawals Withholding of an area of Federal land from settlement, sale, location or entry under some or all of the general land laws in order to reserve the area for a particular public purpose.

WSA Wilderness Study Area. A roadless area of BLM land that has been inventoried and found to be wilderness in character and so must be managed accordingly until Congress designates the area as wilderness or releases it from consideration.

WSR Corridors Wild and Scenic River Corridors. The area surrounding designated Wild & Scenic Rivers that have been set aside to protect the river.

ACTIVITIES:

Activities Group of entities containing features and attributes related to human activities associated with natural resource management.

Archaeology Survey Information about the process of looking for cultural sites.

Area Surveys Group of entities containing data about surveys which cover areas of all sizes.

Biological Activities which use animals or insects for treatment of the land.

Cut Cutting of trees for commercial harvest or for land restoration.

Exclosure Protecting a natural resource such as an Aspen stand or riparian area with a physical exclosure device like a fence.

Fuels (treatment) Vegetation management for the purpose of fire fuels reduction.

Line Surveys Group of entities containing data about surveys which are best represented as line features.

Monitoring The process of repeated sampling and tracking the data over time.

Point Surveys Surveys which are best represented as point features such as specific sampling locations.

Reforestation Survey Information about the success of reforestation activities.

Restoration Activities to secure a land area from damage after a disturbance (rehab) or improve the condition of the resources of an area not covered by other activities including things like brush-beating to restore wildlife habitat.

RxBurn Prescribed fire. Fire treatment of the land to improve the condition of natural resources or for wildfire management.

Sampling The process of recording specific data at specific spatial locations intended to either be representative of larger areas or to be used to isolate change boundaries.

Seed/Plant Seeding of native or non-native plants for any purpose including range improvement, reforestation, and riparian restoration.

Sensitive Species Survey Information about the process of looking for sensitive species occurrences.

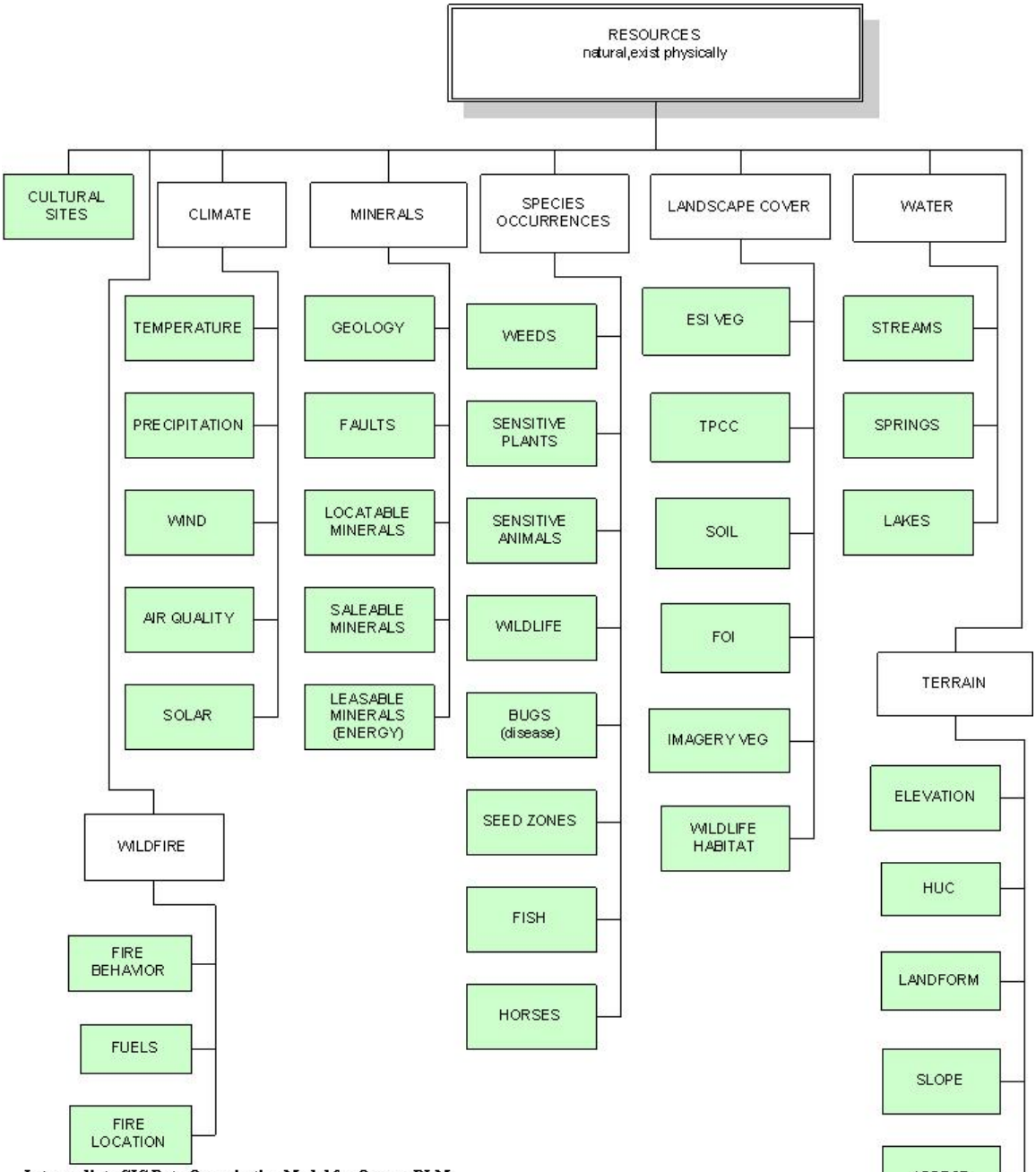
Spray Application of chemicals to the land whether for the purpose of fertilization or eradication.

Surveys Group of entities containing data about the location and methodology of survey and sampling activities.

Stand Exams Timber stand sample areas.

Weed Survey Information about the process of looking for weed infestations.

APPENDIX 2 – ACCESSORY MODELS



Intermediate GIS Data Organization Model for Oregon BLM
October 27, 2003

This model steps back from the more detailed logical entity model (September 2003). The overall goal is the same: to have a complete and concise picture of **all** of the BLMs GIS data, but the organization is not based on any physical implementation. The more detailed model groups data entities according to commonalities of definition, spatial characteristics, core attribute and query requirements and data maintenance considerations. This model groups data entities by subject matter commonality. It is therefore closely tied to BLM program areas such as Fire, Wildlife, Minerals. Each of the program areas will be found in all four of the top level categories (Resources, Facilities, Boundaries and Activities).

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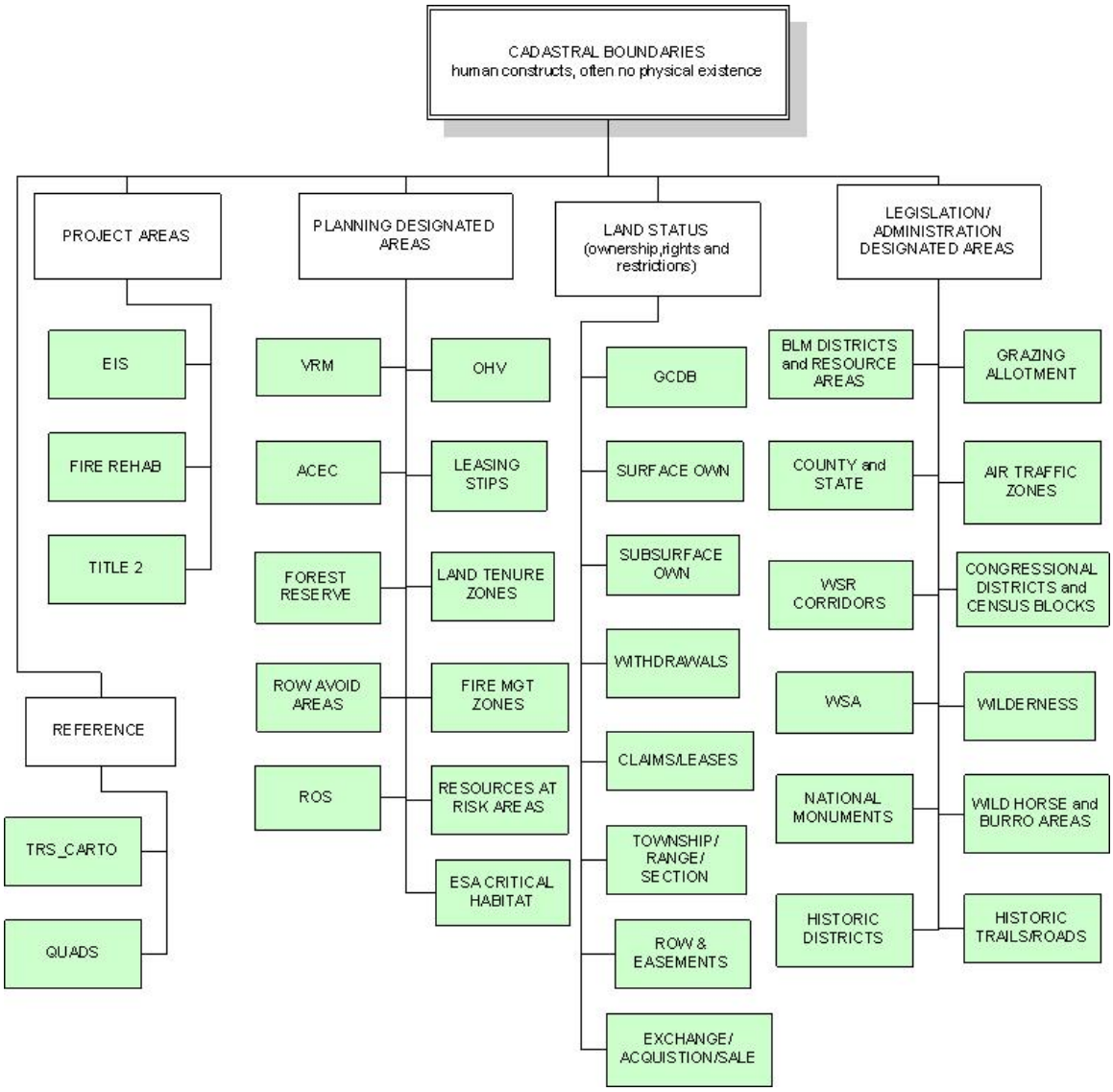

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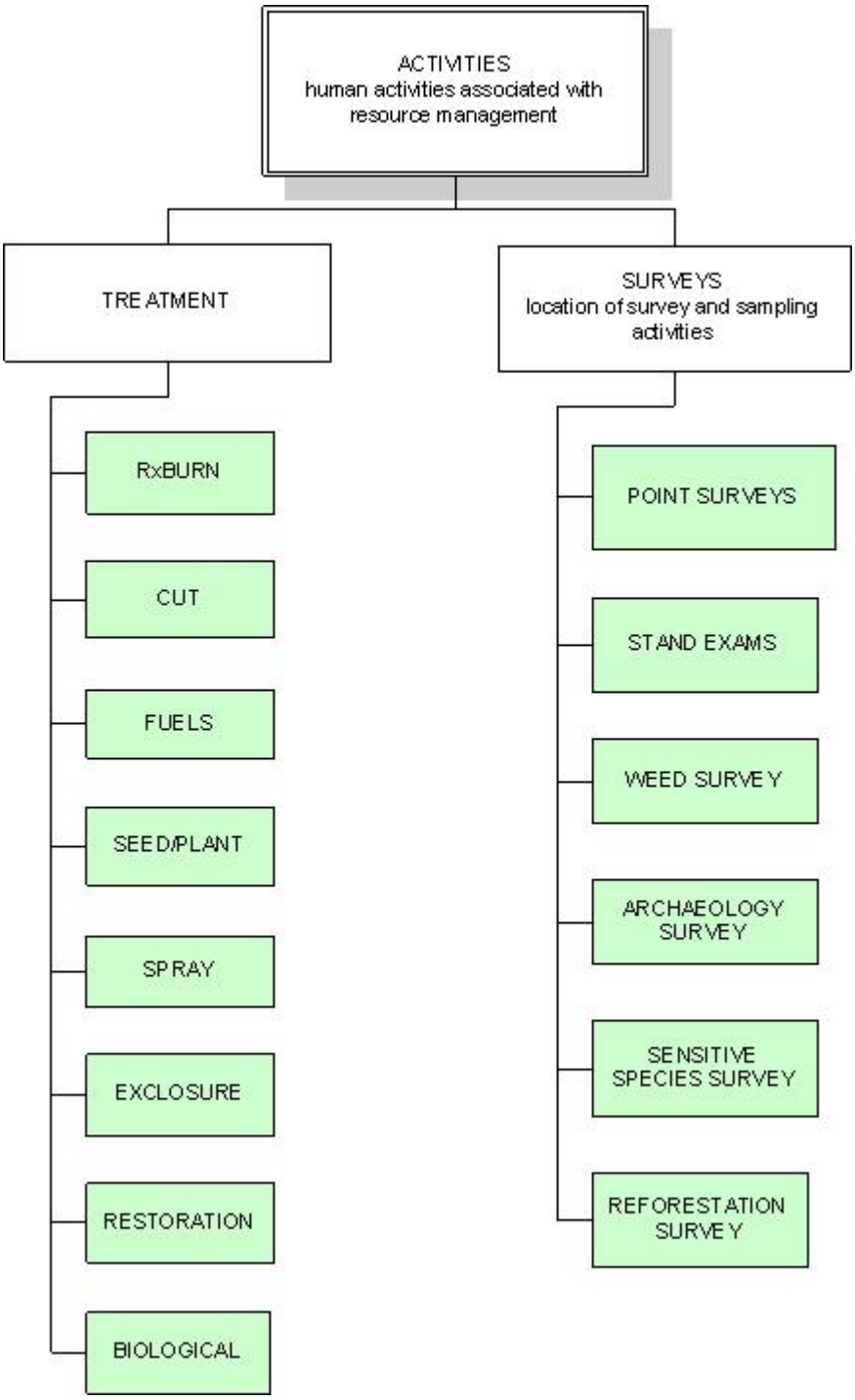
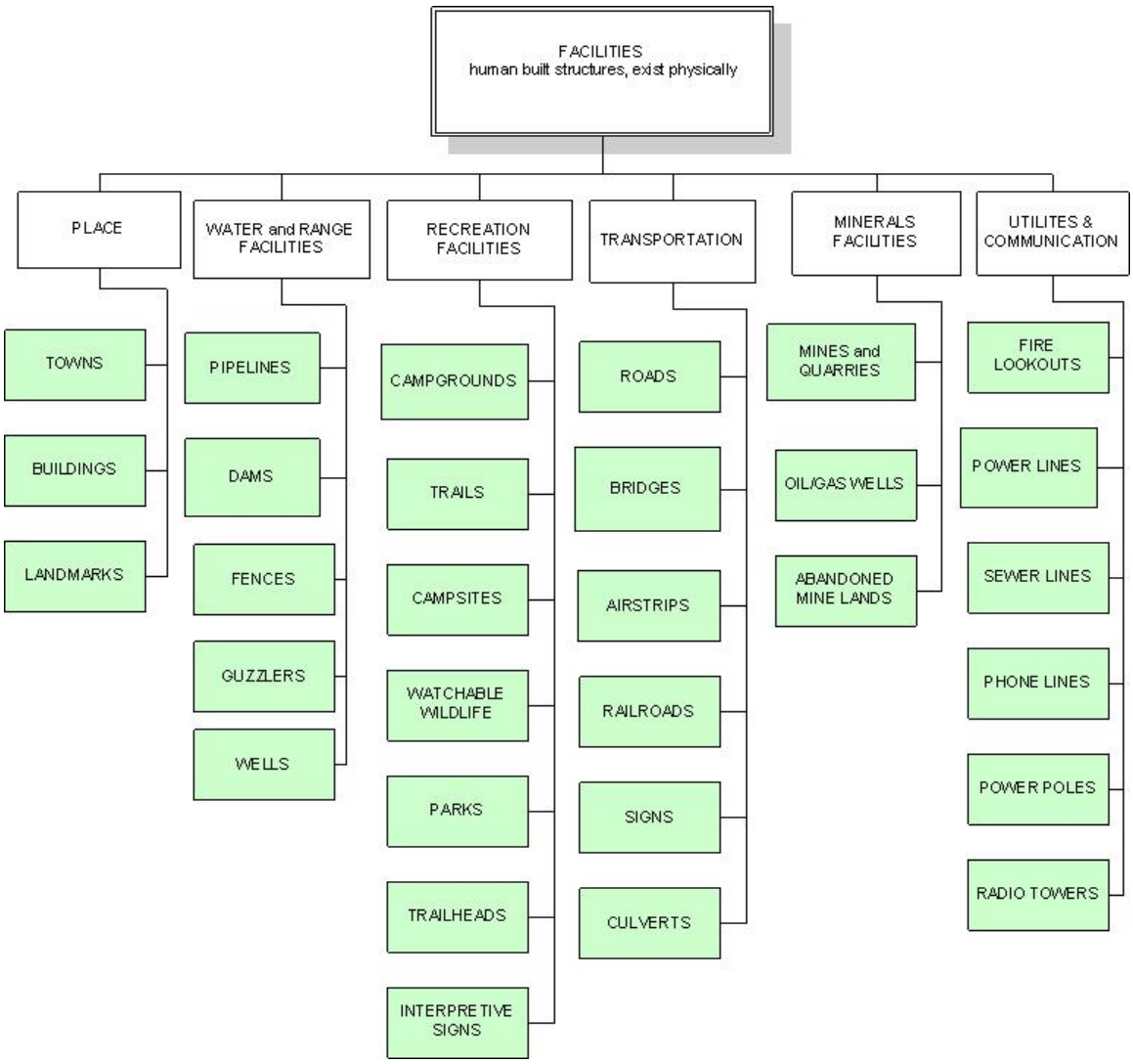


APPENDIX 2 – ACCESSORY MODELS



APPENDIX 3 – MODEL CHANGES DETAIL

Conceptual Model (2nd Draft) – Changes were made to the draft model following team review of the 1st Draft.

Under **Resources**:
SOLAR added to CLIMATE
ARCHAEOLOGY changed to CULTURAL
WATER streams clarified to include canals and lakes to include reservoirs
POPULATIONS changed to SPECIES OCCURRENCES, TIMBER STANDS removed and SEED ZONES added
Much discussion over LANDSCAPE COVER, existing vs potential vs modeled habitat. I attempted another view by putting 3 subgroups under LANDSCAPE for ECOLOGICAL POTENTIAL (soil and PNC veg), CURRENT COVER and MODELS (habitat, fuels, tpcc)
IMAGERY VEG added under LANDSCAPE , CURRENT COVER.

Under **Facilities**:
RANGE split out from WATER
Word "Facilities" added to subgroup titles (e.g. RECREATION FACILITIES) to avoid confusion.
CULTURAL (towns, landmarks) changed to PLACE

Under **Boundaries**:
Name Changed to **Cadastral Boundaries**
Definition of SPECIAL MGT AREAS clarified as "created through planning efforts" and POLITICAL & ADMINISTRATIVE as "created through legislation or administratively" and WSA, WSR Corridors, WILDERNESS, WHB Areas, HISTORIC districts and trails, NATIONAL MONUMENTS moved from the first to the second group
RESOURCES AT RISK areas added to SPECIAL MGT AREAS
FIRE MGT ZONES moved from POLITICAL to SPECIAL MGT
LEASES added to CLAIMS under LAND STATUS
New 2nd level categories added fro PROJECT AREAS and for REFERENCE

Under **Activities:**
Much discussion over ideas of "Survey", "Sampling" and "Monitoring"
MONITOR changed to SAMPLING LOCATIONS (Point) and
SURVEY changed to SURVEY AREA with link field added that links to species occurrence entities to answer the "looked and didn't find" question.

Conceptual Model (3rd Draft) – Additional changes were made after a team conference call to review the 2nd Draft.

Under **Resources:**
MODELS taken out from under LANDSCAPE and made a 2nd level category

with subcategories for HABITAT POTENTIAL, FIRE and VIEWSHEDS
TPCC added under LANDSCAPE ECOLOGICAL POTENTIAL and PNC VEG put back into SOIL
FOI added under LANDSCAPE, CURRENT COVER.

Under **Facilities:**
AIRSTRIPS added under TRANSPORTATION

Under **Boundaries:**
PROJECT AREAS definition clarified
TRS_CARTO and QUADS added under REFERENCE
ESA CRITICAL HABITAT added under SPECIAL MGT AREAS after discussion with some Botanists and Biologists

Under **Activities:**
SAMPLING LOCATIONS and SURVEY AREAS combined into SURVEYS with 3 subcategories for AREA SURVEYS, LINE SURVEYS and POINT SURVEYS
REFORESTATION SURVEY and STAND EXAMS added under AREA SURVEYS
FOI removed from TREATMENT (moved to LANDSCAPE under Resources)
BIOLOGICAL added under TREATMENT

Conceptual Model (4th Draft)- Changes made after conference call to confirm edits.
Under **Cadastral Boundaries:**
Dropped "CADASTRAL", just "BOUNDARIES" now.
Added "external to AIR TRAFFIC ZONES and CENSUS BLOCKS.
Added new green box, COUNTY/STATE LAND USE ZONES, external, under POLITICAL and ADMINISTRATIVE

Under **Facilities:**
Changed green box RANGE FACILITIES to white box and split out subordinate feature types as 3 new green boxes: RANGE_FAC_POINT, RANGE_FAC_LINE and RANGE_FAC_POLY.
Added "gauging stations" and "culverts" to WAT_FAC_POINT examples and removed "culverts" from TRNPOINT.

Under **Activities:**
Just changed the box shapes.

Under **Resources:**
Added words "1. mostly polys plus lines" and "2. external source" to CLIMATE box and removed these words from all subordinate green boxes.
Added green box for PHYSIOGRAPHIC PROVINCES under TERRAIN.
Changed name HUC to HYDROLOGIC UNITS.
Moved VIEWSHEDS from under MODELS to under TERRAIN.

Moved FUELS from under MODELS to under CURRENT COVER.
Changed name BUGS to DISEASE.
Removed the subordinate white boxes under MODELS and just have green boxes.
Under MODELS, changed the definition notes to read:

1. poly
2. new entities created from two or more entities
3. future or past oriented.
4. core atts: model used, input entities

Conceptual Model (5th Draft)- Changes made after first logical model meeting, July 19-22, 2004 in Portland.

Under **Resources:**

Change "MODELS" to "POTENTIAL RESOURCES"
Added SPOTTED OWL HABITAT box under POTENTIAL RESOURCES
Moved LOCATABLE, SALEABLE and LEASABLE MINERALS boxes from under GEOLOGY to under POTENTIAL RESOURCES
Wild Horse Observations (point sitings) added under SPECIES OCCURRENCES
WIND ENERGY POTENTIAL added under POTENTIAL RESOURCES
"WILDLIFE" changed to "WILDLIFE RANGES"
NESTS box added under SPECIES OCCURRENCES
Surveylink added to core atts for CULTURAL SITES
VRM INVENTORY box added directly under RESOURCES

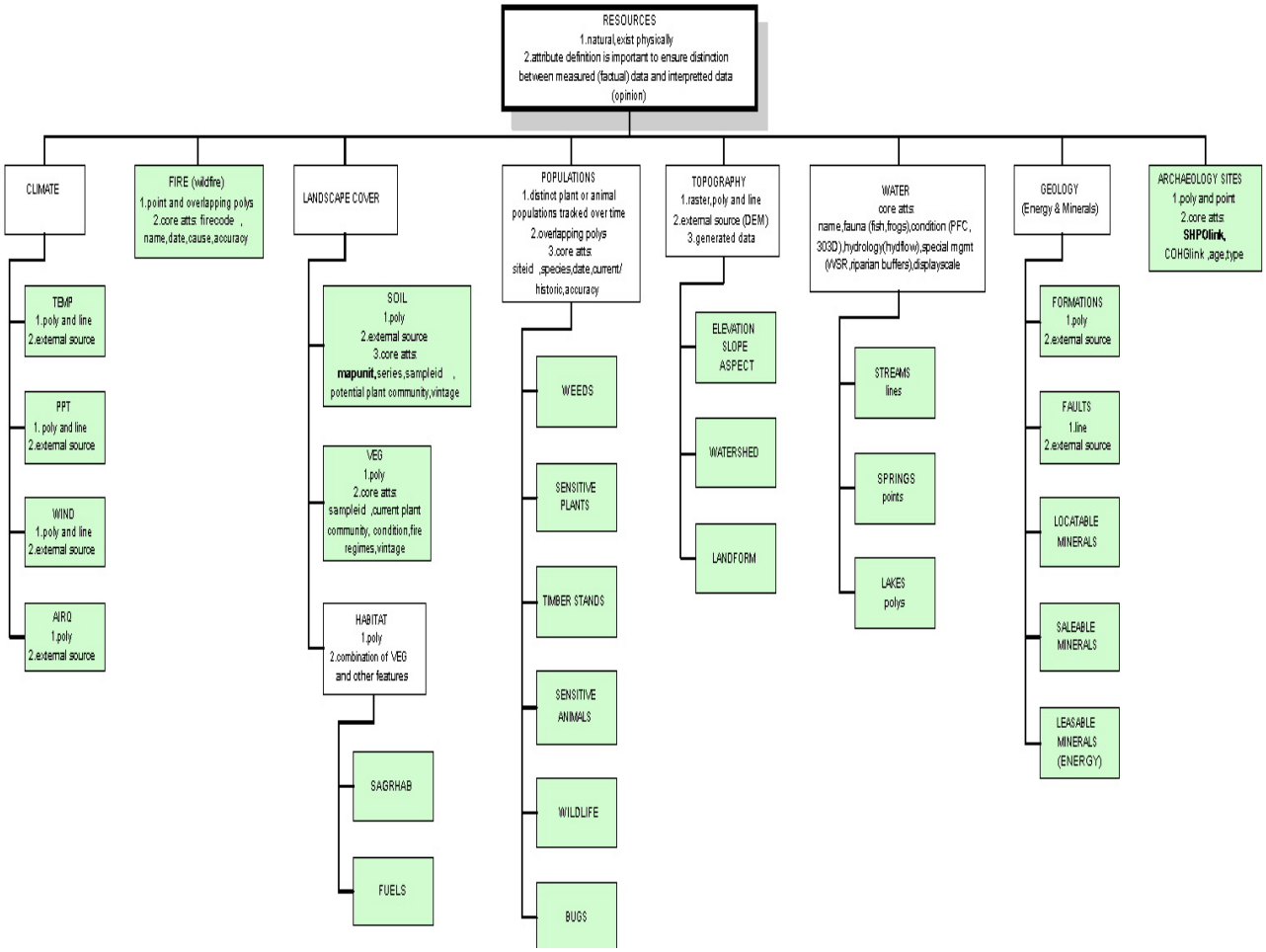
Under **Boundaries:**

"PROJECT AREAS" changed to "PLAN AREAS"
Changed "3. all polys must have corresponding line feature class for source information." to "3. all polys must have corresponding line feature class for source and definition information, except under LAND STATUS and REFERENCE".
Added "1. Often are theme pairs for PROPOSED and FINAL" under SPECIAL MGT AREAS.
Added LUA box under SPECIAL MGT AREAS.
Deleted FOREST RESERVE box under SPECIAL MGT AREAS (included in (LUA).
Moved ESA CRITICAL HABITAT box from SPECIAL MGT AREAS to POLITICAL & ADMINISTRATIVE
Added "3. Includes attributes or themes for PROPOSED, ACTIVE and FINAL status" under EXCHANGE.
Added boxes for SPECIAL FOREST PRODUCTS ZONES and REC MINERAL PRODCUTS ZONES under POLITICAL & ADMINISTRATIVE

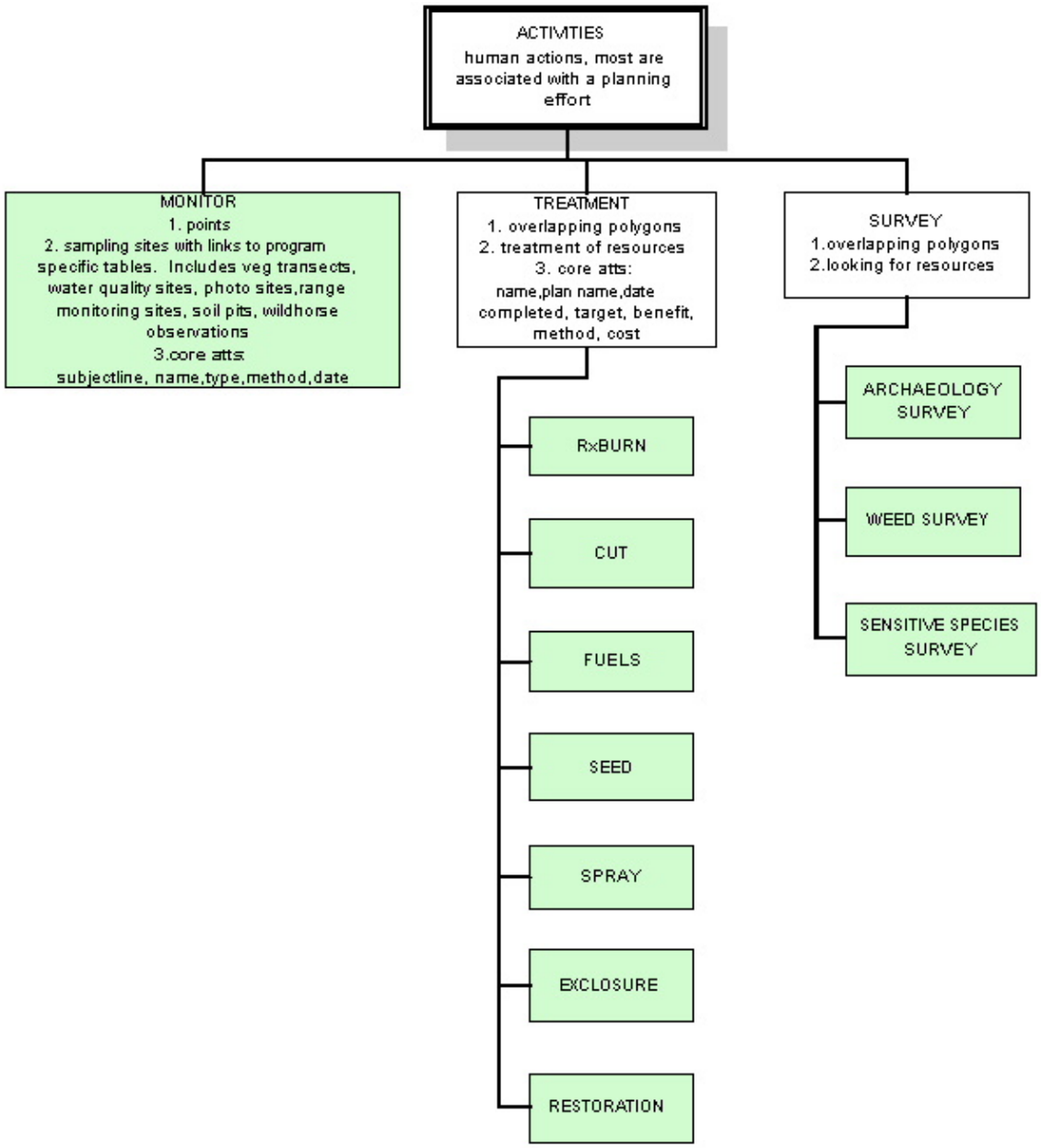
Under **Activities:**

Added "**rips_cd**", "sequence", and "**treatmentlink"** to core atts for TREATMENT and dropped "benefit" and reworded "status = planned, active,completed" to indicate additional themes.
RESTORATION changed to WATER COURSE TREATMENT
Added box for HORSE GATHER under TREATMENT.
Added **treatmentlink** to core atts for SURVEYS

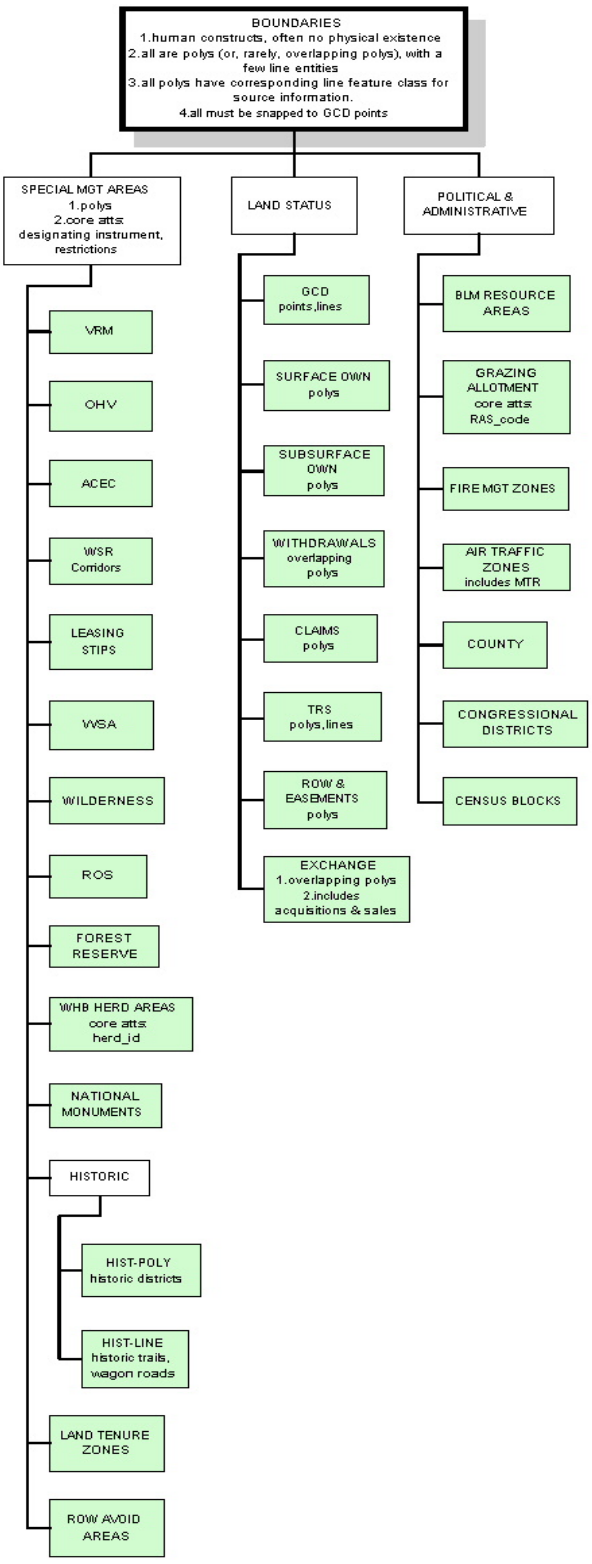
APPENDIX 4 - Initial Conceptual Models (version 1)



APPENDIX 4 - Initial Conceptual Models (version 1)



APPENDIX 4 - Initial Conceptual Models (version 1)


BOUNDARIES
1.human constructs, often no physical existence
2.all are polys (or, rarely, overlapping polys), with a few line entities
3.all polys have corresponding line feature class for source information.
4.all must be snapped to GCD points
SPECIAL MGT AREAS
1.polys
2.core atts: designating instrument, restrictions
LAND STATUS
POLITICAL & ADMINISTRATIVE
VRM
OHV
ACEC
WSR Corridors
LEASING STIPS
WSA
WILDERNESS
ROS
FOREST RESERVE
WHB HERD AREAS
core atts: herd_id
NATIONAL MONUMENTS
HISTORIC
HIST-POLY
historic districts
HIST-LINE
historic trails, wagon roads
LAND TENURE ZONES
ROW AVOID AREAS
GCD
points,lines
SURFACE OWN
polys
SUBSURFACE OWN
polys
WITHDRAWALS
overlapping polys
CLAIMS
polys
TRS
polys,lines
ROW & EASEMENTS
polys
EXCHANGE
1.overlapping polys
2.includes acquisitions & sales
BLM RESOURCE AREAS
GRAZING ALLOTMENT
core atts: RAS_code
FIRE MGT ZONES
AIR TRAFFIC ZONES
includes MTR
COUNTY
CONGRESSIONAL DISTRICTS
CENSUS BLOCKS

APPENDIX 4 - Initial Conceptual Models (version 1)